

Background

Knowledge about tissue vascularisation is fundamental to the colorectal surgeon as a tool to achieve good outcomes. After ligation of the inferior mesenteric artery, the perfusion of the colon relies on the marginal artery. The decision about the proximal transection point is made by the surgeon based either on clinical judgement or on the use of fluorescence angiography with indocyanine green.

While this technology provides qualitative decision support during the operation, there is still a significant element of variability. No formal assessment of interobserver agreement has been conducted in the setting of fluorescence angiography during colorectal resection.

Methods

An image bank was created of colon frames extracted from intraoperative video. Representative frames of colon during fluorescence angiography in overlay mode were selected and were manually segmented. Areas were identified with random letters to avoid bias.

Raters were presented with the images on a web-based display and asked to select where they would do the proximal transection. Ratings were recorded via the web-based bank and assessed independently by each rater. Agreement was assessed with the Kappa statistic and confidence intervals (CI) calculated using bootstrapping with 1000 repetitions.

Agreement below 0.40, between 0.41 and 0.75 and above 0.75 is considered poor, good and excellent respectively. Results were stratified by training level and experience using fluorescence angiography.

Results

7 images were assessed by 22 raters. 2 were excluded due to incomplete information. An example of the images shown can be seen in figure 1. 10 raters were residents and 10 raters were attendings. 3 raters were experts in the use of fluorescence angiography (>5 cases) and 17 were novices.



Figure 1 – example of image shown and distribution of areas chosen for transection by the raters.

The overall agreement in this sample was 0.1387. The agreement between residents was 0.166 (95% CI 0.022 - 0.331) and between consultants was 0.099 (95% CI 0.020 - 0.197, p value 0.02). The agreement between experts was -0.095 (95% CI -0.202 - 0.087) and between novices was 0.159 (95% CI 0.050 - 0.288). The difference is statistically significant.

Conclusion

In this study, a poor agreement in the choice of proximal transection point was demonstrated overall. The agreement was also poor when the group of residents and attendings, and the group of expert users of fluorescence and novice users were compared. These results should be confirmed in a larger sample. Efforts to standardise assessment of perfusion with fluorescence angiography are warranted.